* NOTICES *

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2.**** shows the word which can not be translated.
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CLAIMS

[Claim(s)]
[Claim 1]A personal identification device comprising:
The 1st acquisition means that acquires the 1st information used for personal authentication.
The 2nd acquisition means that acquires said 1st information and the 2nd different information.
A sorting means which classifies said 2nd information acquired by said 2nd acquisition means.
The 1st memory measure that relates with a classification result by said sorting means said 1st information acquired by said 1st acquisition means, and memorizes it, A selecting means which chooses a thing corresponding to said 2nd information newly acquired by said 2nd acquisition means among said 1st information memorized by said 1st memory measure, A collation means which compares said 1st information with said selected selecting means, and said 1st information newly acquired by said 1st acquisition means.

[Claim 2]The personal identification device according to claim 1, wherein said 1st information is fingerprint information or palm-print information.
[Claim 3]Said 2nd acquisition means acquires said two or more 2nd information, and said 1st memory measure, The personal identification device according to claim 1 or 2 relating with each classification result by said sorting means of two or more of said 2nd information acquired by said 2nd acquisition means, and memorizing said 1st information.
[Claim 4]The personal identification device according to claim 1, 2, or 3 dividing said 1st memory measure into two or more storage areas, and memorizing said 1st information to either of said storage areas based on a classification result by said sorting means.
[Claim 5]The personal identification device according to any one of claims 1 to 4 which said 1st memory measure is in a state which a classification result by said sorting means was made to accompany, and is characterized by memorizing said 1st information.
[Claim 6]The personal identification device according to any one of claims 1 to 5, wherein said selecting means chooses what agrees with a classification result by said sorting means of said 2nd information newly acquired by said 2nd acquisition means from said 1st information memorized by said 1st memory measure.
[Claim 7]Said selecting means from said 1st information memorized by said 1st memory measure. The personal identification device according to any one of claims 1 to 6 determining a priority based on a classification result by said sorting means of said 2nd information newly acquired by said 2nd acquisition means, and choosing said 1st information according to said priority.
[Claim 8]The personal identification device according to any one of claims 1 to 7, wherein said 2nd information includes press information on a subject, temperature information, humidity information, sexual desire news, area information, angle information, thickness information, or configuration information.
[Claim 9]The personal identification device according to any one of claims 1 to 8, wherein it has further the 2nd memory measure that memorizes a predetermined reference value corresponding to said 2nd information and said sorting means classifies said 2nd information based on said reference value memorized by said 2nd memory measure.
[Claim 10]The personal identification device according to claim 9 having further an update means

which updates said reference value memorized by said 2nd memory measure.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the personal identification device which enabled it to perform personal authentication processing at high speed, without decreasing the characteristic quantity of a fingerprint or palm print about a personal identification device, without having highly efficient operation part and memory storage with a large storage capacity in particular.
[0002]
[Description of the Prior Art]For example, when managing users, such as various kinds of information processors, such as management of ON leaving, a personal computer, and a copying machine, or an image processing device, the art for specifying an individual is needed. As a means to specify an individual, biometrics attracts attention and the personal authentication system by the fingerprint or palm print is being especially put in practical use also in it. A fingerprint and palm print are the features peculiar to an individual.
As a means to specify an individual, it is dramatically effective.

[0003]
[Problem(s) to be Solved by the Invention]However, when incorporating the characteristic quantity of a fingerprint or palm print as electronic data, the data volume will become huge. Two or more characteristic quantity which registers the characteristic quantity of a fingerprint or palm print beforehand, and is registered when performing processing which specifies an individual based on it, and the operation amount which is needed in order to have to perform processing which compares the inputted characteristic quantity will become huge. Especially the calculation time that is needed for collation processing when there are many users registered beforehand has a possibility of becoming very long.
[0004]In order to shorten the time concerning collation processing, in such a collation system, it had to have highly efficient operation part and memory storage with a large storage capacity, and had become a cause of the cost hike of the whole device. In order to realize specific processing of the individual using a fingerprint or palm print, without raising the cost of a device, the method of decreasing characteristic quantity is also considered, but when decreasing characteristic quantity, authentication precision will fall remarkably.
[0005]This invention is made in view of such a situation, and it enables it to perform personal authentication processing at high speed, without decreasing the characteristic quantity of a fingerprint or palm print, without having highly efficient operation part and memory storage with a large storage capacity.
[0006]
[Means for Solving the Problem]The 1st acquisition means that acquires the 1st information for which a personal identification device of this invention is used for personal authentication, The 2nd acquisition means that acquires the 1st information and the 2nd different information, and a sorting means which classifies the 2nd information acquired by the 2nd acquisition means, The 1st memory measure that relates with a classification result by a sorting means the 1st

information acquired by the 1st acquisition means, and memorizes it, A selecting means which chooses a thing corresponding to the 2nd information newly acquired by the 2nd acquisition means among the 1st information memorized by the 1st memory measure, It has a collation means which compares the 1st information with a selected selecting means, and the 1st information newly acquired by the 1st acquisition means.

[0007]Said 1st information is information peculiar to an individual, for example, is a user's fingerprint, palm print, etc. As for said 2nd information, a certain grade is information showing the individual feature and a peculiarity, For example, for example, it is press of a subject used for authenticating processings, such as a user's finger or a hand, temperature, humidity, a color, area (for example, concentration etc.), an angle, thickness, or shape whether the point is sharp or it is round.

[0008]Since the 1st information is information for specifying an individual, there is dramatically much amount of information. As compared with the 1st information, it is good for the 2nd information used in order to classify the 1st information to use what has the few amount of information.

[0009]Said 1st acquisition means acquires information peculiar to individuals, such as a user's fingerprint or palm print, as information used for personal authentication, and is constituted by CCD5 of drawing 1 and drawing 2, etc. Said 1st acquisition means may enable it to acquire image data of a user's face as the 1st information, for example.

[0010]Said 2nd acquisition means in order to classify dictionary data used for authenticating processing at the time of registration at the time of search. In order to narrow down dictionary data used for search and to perform personal authentication promptly, unlike a user's fingerprint used for personal authentication, palm print, etc., a certain grade, it is what acquires information showing the individual feature and a peculiarity -- for example, drawing 1 and the pressure sensor 6 of drawing 2, the photosensor 21 of drawing 3, the density calculation section 31 of drawing 5, the area calculation part 41 of drawing 7, the angle calculation part 51 of drawing 9, and the sequence-of-numbers acquisition part 61 of drawing 11 -- or, It is constituted by the humidity sensor 81 of drawing 21, etc.

[0011]When the 2nd information acquired by the 2nd acquisition means is pressure information, said sorting means classifies the pressure information into a pressure "size", a pressure "inside", a pressure "smallness", and two or more classes, and is constituted by the comparing element 13 of drawing 2, etc., for example. Registration of dictionary data and selection of dictionary data used at the time of attestation are performed based on this classification.

[0012]In order to use a personal identification device of this invention, it is necessary to register a user's certification information first. Said 1st memory measure registers certification information registered as dictionary data based on a classification result of the 2nd information, and is constituted by the registration dictionary data base 20 of drawing 2, etc.

[0013]And at the time of execution of authenticating processing, the 1st acquisition means acquires fingerprint feature amounts etc. of a user who is the target of authenticating processing, for example, and the 2nd acquisition means acquires temperature information etc. of a finger of a user who is the target of authenticating processing.

[0014]Said selecting means so that it is necessary to perform collation processing using no information (for example, all the fingerprint feature amounts registered) memorized by memory measure, Out of the 1st information registered, a thing corresponding to temperature information etc. which were acquired by the 2nd acquisition means is chosen, and it is constituted by the matching part 16 of drawing 2, etc.

[0015]Said collation means compares whether the 1st information, including a user's fingerprint feature amounts with a selected selecting means, etc., has some which agree with the 1st information that is the target of authenticating processing acquired by the 1st acquisition means, and is constituted by the matching part 16 of drawing 2, etc.

[0016]In a personal identification device of this invention, the 1st information used for personal authentication is acquired, The 1st information and the 2nd different information are acquired and the 2nd information is classified, A thing corresponding to the 2nd information that the 1st acquired information related with a classification result, and was memorized and was newly

acquired by the 2nd acquisition means among the 1st memorized information is chosen, and the 1st selected information and the 1st newly acquired information are compared.
[0017]Therefore, based on the 2nd information with comparatively little amount of information, including a pressure, temperature, or humidity, the 1st information, including a fingerprint, palm print, etc., is classified and memorized, and at the time of authenticating processing. Information used for collation processing becomes possible [processing promptly], without reducing authentication precision, since it is narrowed down based on the 2nd information.
[0018]The 1st information shall be fingerprint information or palm-print information.
[0019]Two or more 2nd information can be made to acquire, it relates with each classification result by a sorting means of two or more 2nd information acquired by the 2nd acquisition means, and the 1st memory measure can be made to memorize the 1st information in the 2nd acquisition means.
[0020]That is, for example, the 2nd acquisition means can be made to acquire two or more information, including humidity information, concentration information, etc., in addition to information used for personal authentication, such as fingerprint feature amounts. In this case, as shown in drawing 23, humidity data is added to two or more registration dictionaries (in drawing 23, they are the registration dictionary 91-1 thru/or the registration dictionary 91-3) classified according to concentration, respectively, and fingerprint feature amounts are registered into a memory measure, for example. Therefore, since collation processing can be performed after narrowing down information compared using two or more information at the time of personal authentication, these processings can be performed still more nearly promptly.
[0021]The number of the 2nd information that the 2nd acquisition means acquires may not be two, for example, it cannot be overemphasized that it is good as arbitrary numbers, such as three and five. Combination of the 2nd information may also be made into arbitrary combination.
[0022]The 1st memory measure shall be divided into two or more storage areas, and shall memorize the 1st information to either of the storage areas based on a classification result by a sorting means.
[0023]Namely, the 1st memory measure like the registration dictionary 71-1 of the registration dictionary data base 20 shown in drawing 18 thru/or the registration dictionary 71-3, Based on whether two or more registration dictionaries could be formed, for example, a pressure was classified with "size", it was classified "inside", or it was classified with "smallness", a dictionary in which information used for personal authentication, such as fingerprint feature amounts, is registered is chosen. Therefore, after choosing a registration dictionary for performing collation processing, it can process promptly by performing collation processing.
[0024]The 1st memory measure shall be in a state which a classification result by a sorting means was made to accompany, and shall memorize the 1st information.
[0025]That is, to the 1st memory measure, information used for personal authentication, such as fingerprint feature amounts, with information whether a pressure was classified with "size", it was classified "inside" like the registration dictionary data base 20 shown in drawing 14, or it was classified with "smallness" is memorizable. Therefore, after narrowing down information beforehand based on a classification result, it can process promptly by performing collation processing.
[0026]What agrees with a classification result by a sorting means of the 2nd information newly acquired by the 2nd acquisition means can be made to choose it as a selecting means from the 1st information memorized by the 1st memory measure.
[0027]That is, when information corresponding to the 2nd information is classified as it is pressure information, for example and a pressure is "inside", only what is a pressure "inside" is extracted from fingerprint-feature-amounts data registered into a registration dictionary data base shown in drawing 14, for example, and it is used for collation processing. Therefore, after narrowing down information beforehand based on a classification result, it can process promptly by performing collation processing.
[0028]A priority is determined based on a classification result by a sorting means of the 2nd information newly acquired by the 2nd acquisition means, and the 1st information can be made to choose it as a selecting means from the 1st information memorized by the 1st memory measure

according to a priority.
[0029]Namely, when information corresponding to the 2nd information is classified as it is pressure information, for example and a pressure is "size", For example, what is a pressure "size" is first chosen from fingerprint-feature-amounts data registered into a registration dictionary data base shown in drawing 14, and it is used for collation processing, next what is a pressure "inside" is chosen, finally what is a pressure "smallness" is chosen, and it is used for collation processing. Therefore, since all the information is used eventually and collation processing is performed also when it can process promptly and classification results differ further by performing collation processing after a classification result narrows down information beforehand in a right case, a right authentication result can be obtained.
[0030]The 2nd information shall include press information on a subject, temperature information, humidity information, sexual desire news, area information, angle information, thickness information, or configuration information.
[0031]Although these 2nd information has less amount of information than information for distinguishing an individual, including a fingerprint, palm print, etc., it expresses the individual feature, a peculiarity, etc., for example. High-speed processing can be realized without [after narrowing down information used for collation using such information, without it uses a highly efficient arithmetic unit by being made to perform collation processing, and] dropping accuracy of collation.
[0032]The 2nd memory measure that memorizes a predetermined reference value corresponding to the 2nd information can be made to have further, and the 2nd information can be made to classify into a sorting means based on a reference value memorized by the 2nd memory measure.
[0033]For example, said 2nd memory measure comprises the reference value memory 14 of drawing 2, etc., and can make a reference value for a classification memorize. That is, when a thing corresponding to the 2nd information is a size of a finger, a reference value of the number of black pixels which the area calculation part 41 of drawing 7 computes is memorized by the reference value memory 14. For example, if it is the 150 or more numbers of black pixels when two reference values, 150 and 100, are memorized, area will be classified with "size", and it is classified that area is "smallness" when [less than 150] area will be classified "inside" if it is 100 or more, and it is 100 or less.
[0034]An update means which updates a reference value memorized by the 2nd memory measure can be made to have further.
[0035]For example, with the interface 15 of drawing 2, etc., said update means is constituted and a user, A reference value can be arbitrarily changed by inputting a control signal for making a reference value change from an input device which is not illustrated or other information processors via the interface 15.
[0036]
[Embodiment of the Invention]Hereafter, an embodiment of the invention is described with reference to figures.
[0037]Drawing 1 is a side sectional view showing an example of the fingerprint reading part of the fingerprint collation device which was adapted in this invention. For example in ON leaving management and user management of a copying machine, since an individual is specified, a fingerprint collation device is used.
[0038]The fingerprint reading part is made as [detect / information other than a fingerprint], in order to accelerate collation processing, while reading the image data of a user's fingerprint. Information other than this fingerprint is hereafter called the characteristic quantity for main classes. Although an individual cannot be specified as the characteristic quantity for main classes like a fingerprint, the information which shows the individual feature in a certain grade which expresses the individual's feature and peculiarity is used. In the case of drawing 1, the pressure to the reading surface 3 of a user's finger 4 shall be detected as characteristic quantity for main classes.
[0039]The light source 1 irradiates the reading surface 3 with the light of predetermined intensity via the prism 2. A user's finger 4 is put on the reading surface 3. The catoptric light hit and

reflected in the reading surface 3 enters into CCD(Charge-Coupled Devices) 5 via the prism 2. CCD5 changes an optical (picture) signal into an electrical signal using the semiconductor device (photo-diode) from which a storage capacity changes according to the input of light. The pressure sensor 6 is formed in the reading surface 3, and the pressure generated when a user put the finger 4 on the reading surface 3 is detected as characteristic quantity for main classes.
[0040]Drawing 2 is a block diagram showing the example of an internal configuration of the fingerprint collation device which was adapted in this invention.
[0041]The pressure of a user's finger 4 detected by the pressure sensor 6 is inputted into the amplifier 11, is amplified, and is inputted into the A/D conversion part 12. The A/D conversion part 12 changes the inputted analog signal into a digital signal, and outputs it to the comparing element 13. The comparing element 13 reads the reference value of the pressure registered into the reference value memory 14, compares the value and reference value which were inputted, and outputs a comparison result to the matching part 16 as characteristic quantity for main classes. If the data which the reference value A and the reference value B are registered, and is inputted into the comparing element 13 from the A/D conversion part 12, for example is beyond the reference value A, in the reference value memory 14 the main class characteristic quantity, It is classified into a pressure "size", if it is beyond the less than reference-value A reference value B, it will be classified into a pressure "inside", and it will be classified into a pressure "smallness" if it is less than the reference value B. Each reference value registered into the reference value memory 14 is made as [be / a user / able to change arbitrarily] via the interface 15 based on the signal inputted from the input device which is not illustrated or other information processors.
[0042]The picture signal corresponding to a user's fingerprint outputted from CCD5 is inputted into the amplifier 17, is amplified, and is inputted into the A/D conversion part 18. The A/D conversion part 18 changes the inputted analog signal into a digital signal, and outputs it to Image Processing Division and the feature extraction part 19. Image Processing Division and the feature extraction part 19 perform predetermined processing to the inputted image data, extract the feature of a user's fingerprint, and output it to the matching part 16 as fingerprint feature amounts.
[0043]The matching part 16 registers into the registration dictionary data base 20 a user's fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 in the registration processing of fingerprint data based on the characteristic quantity for main classes into which it was inputted from the comparing element 13. Based on the characteristic quantity for main classes which was inputted from the comparing element 13 in fingerprint authentication processing as for the matching part 16, After narrowing down the fingerprint-feature-amounts data registered into the registration dictionary data base 20, a user's fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 judge whether it is in agreement with the fingerprint registered, and output the result.
[0044]It is good as characteristic quantity for main classes as for a method of detecting temperature, humidity, etc. of the finger 4 of a user by replacing with the pressure sensor 6, for example, forming a temperature sensor, a humidity sensor, etc.
[0045]It may be made to detect the thickness (thickness) of a user's finger 4 as characteristic quantity for main classes by replacing with the pressure sensor 6 and forming the photosensor 21 which comprises the light projection part 21-1 and the light sensing portion 21-2, as shown in drawing 3.
[0046]Drawing 4 is a side sectional view in the embodiment from which drawing 1 of the fingerprint reading part of the fingerprint collation device which was adapted in this invention differs. The same numerals are given to the case in drawing 1, and the corresponding portion, and the explanation is omitted suitably (following, the same).
[0047]The fingerprint reading part shown in drawing 4 is the composition of having omitted the pressure sensor 6 from the fingerprint reading part explained using drawing 1. That is, when shown in drawing 4, it is made as [extract / the characteristic quantity for main classes] from the image data of a user's finger 4 acquired using CCD5.

[0048]Drawing 5 is a block diagram showing the example of an internal configuration of a fingerprint collation device provided with the fingerprint reading part shown in drawing 4.
[0049]The picture signal detected by CCD5 is amplified with the amplifier 17, and it is outputted to the density calculation section 31 while it is changed into a digital signal by the A/D conversion part 18 and being outputted to Image Processing Division and the feature extraction part 19.
[0050]As shown in drawing 6, from the picture of the finger 4 acquired by CCD5, the density calculation section 31 extracts the border line of the finger 4, and computes the average concentration in the extracted outline. The comparing element 13 measures the outline Uchihira [Hitoshi] concentration inputted as the reference value registered into the reference value memory 14, and outputs the comparison result to the matching part 16. For example, the outline Uchihira [Hitoshi] concentration computed by the density calculation section 31 is the value 220, the reference value memory 14 -- concentration -- "-- the reference value for being classified with dark" -- 200 and concentration -- "-- when it is registered that the reference value for being classified with light" is 100, the comparing element 13, the outline Uchihira [Hitoshi] concentration detected by the density calculation section 31 -- "-- it judges that it is dark" and the decision result is outputted to the matching part 16 as characteristic quantity for main classes.
[0051]The matching part 16 registers into the registration dictionary data base 20 a user's fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 in the registration processing of fingerprint data based on the characteristic quantity for main classes into which it was inputted from the comparing element 13. The fingerprint feature amounts of the user by whom the matching part 16 was inputted from Image Processing Division and the feature extraction part 19 in fingerprint authentication processing, Based on the characteristic quantity for main classes inputted from the comparing element 13, it searches from the registration dictionary data base 20, and it judges whether it is in agreement with the fingerprint with which the user's inputted fingerprint is registered, and the result is outputted.
[0052]As shown in drawing 7, instead of the density calculation section 31 of drawing 5, the area of a user's finger 4 put on the reading surface 3 can also be used as characteristic quantity for main classes by forming the area calculation part 41.
[0053]As shown in drawing 8, the area calculation part 41 computes the area of the finger 4 which is in contact with the reading surface 3 by binary-izing the picture of the finger 4 acquired by CCD5. Namely, the area calculation part 41 computes the number of average black pixels of the binary-ized picture, and outputs it to the comparing element 13. The comparing element 13 compares the number of black pixels inputted as the reference value of the number of black pixels registered into the reference value memory 14, and outputs the comparison result to the matching part 16. For example, the number of black pixels computed by the area calculation part 41 is the value 80, When it is registered that a reference value for the reference value for being classified into the reference value memory 14 with area "size" to be classified with 150 and area "smallness" is 100, the comparing element 13, The area of the finger 4 detected by the area calculation part 41 judges that it is "smallness", and outputs the decision result to the matching part 16 as characteristic quantity for main classes.
[0054]As shown in drawing 9, instead of the density calculation section 31 of drawing 5, and the area calculation part 41 of drawing 7, the angle of a user's finger 4 put on the reading surface 3 can also be used as characteristic quantity for main classes by forming the angle calculation part 51.
[0055]That is, as shown in drawing 10, the angle calculation part 51 extracts a border line from the picture of the finger 4 acquired by CCD5. The angle calculation part 51 asks for the direction vector of the extracted border line. A direction vector is determined by the physical relationship of a noticed picture element and the following pixel, When a border line progresses to the pixel right above a noticed picture element, a direction vector is set to 0, when going to the diagonal right and progressing to 1 and the right similarly hereafter, 0 and the diagonal below are set to 1, the left is set to -2, and, in the diagonal left, -1 and right under become [2 and the diagonal below] -1. The angle calculation part 51 computes the sum of all the vectors, and outputs it to

the comparing element 13. The comparing element 13 compares the reference value registered into the reference value memory 14 with the inputted sum of a vector.
[0056]For example, if the added result of the vector inputted from the angle calculation part 51 is a positive value, The finger 4 assumes that it leans to the right, if an added result is a negative value, the finger 4 will assume that it leans to the left, and if an added result is 0, Though the finger 4 is placed straight, it is good, and when an added result is two or more, the finger 4 assumes that it leans to the right, when an added result is less than -2, the finger 4 assumes that it leans to the left, and when an added result is less than more than -11, the finger 4 is good also as what is placed straight. The comparing element 13 outputs the decision result to inclination of the finger 4 to the matching part 16 as characteristic quantity for main classes.
[0057]As shown in drawing 11, instead of the density calculation section 31 of drawing 5, the area calculation part 41 of drawing 7, or the angle calculation part 51 of drawing 9, the shape (acutance of image) of a user's finger 4 put on the reading surface 3 can also be used as characteristic quantity for main classes by forming the sequence-of-numbers acquisition part 61.
[0058]That is, as shown in drawing 12, the sequence-of-numbers acquisition part 61 extracts a border line from the picture of the finger 4 acquired by CCD5. The sequence-of-numbers acquisition part 61 asks for the direction vector of the extracted border line. A direction vector is determined by the physical relationship of a noticed picture element and the following pixel like the case in the angle calculation part 51 explained using drawing 10. The sequence-of-numbers acquisition part 61 acquires the value of all the vectors as a sequence of numbers, and outputs it to the comparing element 13. The comparing element 13 compares the reference value registered into the reference value memory 14 with the inputted sequence of numbers.
[0059]For example, the typical sequence of numbers detected from a finger with high (that is, the point sharpened) acutance of image by the reference value memory 14, Register beforehand the typical sequence of numbers detected from an average finger, and the typical sequence of numbers detected from a finger with low (that is, the point is round) acutance of image, and the comparing element 13, Each sequence of numbers registered into the reference value memory 14 is compared with the inputted sequence of numbers, and the acutance of image of a user's finger 4 judges whether it is high, common, or low. The comparing element 13 outputs the decision result to the matching part 16 as characteristic quantity for main classes.
[0060]Next, with reference to the flow chart of drawing 13, as explained using drawing 1 thru/or drawing 12, the registration processing 1 in the case of extracting one characteristic quantity for main classes in addition to fingerprint feature amounts is explained. Here, the case where the pressure of a user's finger 4 is detected is explained as characteristic quantity for main classes using the fingerprint collation device explained using drawing 1 and drawing 2.
[0061]Via the amplifier 17 and the A/D conversion part 18, based on the image data of a user's finger 4 inputted from CCD5, Image Processing Division and the feature extraction part 19 extract fingerprint feature amounts, and output them to the matching part 16 in Step S1.
[0062]In Step S2, the comparing element 13 via the amplifier 11 and the A/D conversion part 12, The signal which shows the pressure of a user's finger 4 inputted from the pressure sensor 6 is compared with the reference value for determining the classification of a pressure registered into the reference value memory 14, the characteristic quantity for main classes is extracted, and it outputs to the matching part 16.
[0063]In Step S3, to the fingerprint feature amounts registered into the same dictionary, respectively unique ID is assigned, is registered into the registration dictionary data base 20 with the extraction result of the characteristic quantity for main classes, and processing is ended by the fingerprint feature amounts as which the matching part 16 is inputted.
[0064]Namely, as shown in drawing 14, to the registration dictionary data base 20. A dictionary is prepared only one and the classification result (here pressure size, inside, or smallness) of ID assigned uniquely, respectively and the pressure which is the characteristic quantity for main classes is registered with fingerprint feature amounts to the fingerprint feature amounts registered into the same dictionary.
[0065]Although the case where the pressure of the finger 4 was detected was explained as

characteristic quantity for main classes here, As characteristic quantity for main classes, when the temperature of the finger 4, humidity, thickness, the concentration of a color, area, an angle, or acutance of image is used, a user's fingerprint feature amounts and characteristic quantity for main classes are registered into the registration dictionary data base 20 by the registration processing 1 explained using drawing 13, and the same processing.
[0066]Next, with reference to the flow chart of drawing 15, the fingerprint authentication processing 1 of a fingerprint collation device in which it has the registration dictionary data base 20 registered by the registration processing 1 explained using drawing 14 is explained.
[0067]In Step S11 and Step S12, the same processing as Step S1 of drawing 13 and Step S2 is performed.
[0068]In Step S13, the matching part 16 chooses and extracts only the fingerprint-feature-amounts data corresponding to the extraction result of the characteristic quantity for main classes from the registration dictionary data base 20.
[0069]In Step S14, the matching part 16 performs fingerprint authentication processing to the fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 using the fingerprint-feature-amounts data extracted in Step S13.
[0070]In Step S15, the matching part 16 judges whether there is any fingerprint-feature-amounts data which agrees with the fingerprint feature amounts inputted into the fingerprint-feature-amounts data extracted in Step S13 from Image Processing Division and the feature extraction part 19.
[0071]In Step S15, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint-feature-amounts data, in Step S16, the signal which shows that the matching part 16 was compared correctly is outputted, and processing is ended.
[0072]In Step S15, when it is judged that there is no fingerprint-feature-amounts data which agrees with the inputted fingerprint-feature-amounts data, in Step S17, the signal which shows that the matching part 16 was not compared correctly is outputted, and processing is ended.
[0073]By performing such processing, it becomes unnecessary for the matching part 16 to compare the fingerprint feature amounts inputted as all the fingerprint-feature-amounts data registered into the registration dictionary data base 20, and it can accelerate collation processing.
[0074]However, since the characteristic quantity for main classes is not what is data in which a user's feature and peculiarity are shown, and can identify a user certainly to the last, In the fingerprint authentication processing 1 explained using drawing 15, There is a possibility that the fingerprint feature amounts which correspond in the stage of extraction of the fingerprint-feature-amounts data in Step S13 depending on the element chosen as characteristic quantity for main classes and the reference value registered into the reference value memory 14 will not be extracted, slightly.
[0075]Then, when there are no fingerprint feature amounts [be / it / under / of the extracted fingerprint-feature-amounts data / correspondence], it may be made to perform fingerprint authentication processing again using the fingerprint-feature-amounts data which was not extracted. The fingerprint authentication processing 2 is explained with reference to the flow chart of drawing 16.
[0076]In Step S31 thru/or Step S35, the same processing as Step S11 of drawing 15 thru/or Step S15 is performed.
[0077]In Step S35, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, processing progresses to Step S38.
[0078]In Step S35, when it is judged that there is no fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, in Step S36, the matching part 16 performs fingerprint authentication processing using the fingerprint-feature-amounts data which was not extracted in Step S33.
[0079]In Step S37, the matching part 16 judges whether there is any fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts as a result of fingerprint authentication processing of Step S36.
[0080]in Step S35, when it is judged that there is fingerprint-feature-amounts data which agrees

with the inputted fingerprint feature amounts, In Step S37, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, in Step S38, the signal which shows that the matching part 16 was compared correctly is outputted, and processing is ended.
[0081]In Step S37, when it is judged that there is no fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, in Step S39, the signal which shows that the matching part 16 was not compared correctly is outputted, and processing is ended.
[0082]When extraction of the characteristic quantity for main classes is successful by processing explained using drawing 16, Since fingerprint authentication processing is performed promptly and compared fingerprint feature amounts from all the registration data still more nearly eventually, when the extraction result of the characteristic quantity for main classes differs from the time of dictionary registration, a right collated result can be obtained.
[0083]In the fingerprint authentication processing 2 explained using drawing 16, When it was judged that there are no fingerprint feature amounts corresponding to the fingerprint-feature-amounts data extracted based on the characteristic quantity extraction result for main classes in Step S35, in Step S36, explained as what performs fingerprint authentication processing using the fingerprint-feature-amounts data of all the remainder, but. For example, based on the extraction result of the characteristic quantity for main classes of Step S32, the priority of the characteristic quantity for main classes is determined, fingerprint-feature-amounts data is chosen according to the priority, and it may be made to extract. For example, when judged as a pressure "size", in Step S32 first, The fingerprint-feature-amounts data which is a pressure "size" is chosen and extracted, and in it, When [when there are no corresponding fingerprint feature amounts next] the fingerprint-feature-amounts data which is a pressure "inside" is chosen and extracted and there are no fingerprint feature amounts [be / it / under / of it / correspondence], the fingerprint-feature-amounts data which is finally a pressure "smallness" is chosen, and it may be made to be made to be extracted it.
[0084]In the processing explained using drawing 13 thru/or drawing 16, As opposed to the fingerprint feature amounts which a dictionary is prepared for the registration dictionary data base 20 only one, and are registered into the same dictionary, Although the classification result (here size, inside, smallness) of ID assigned uniquely, respectively and the pressure which is the characteristic quantity for main classes extracts fingerprint feature amounts [/ based on the classification result which was registered with fingerprint feature amounts and registered in fingerprint authentication processing] and was made to perform collation processing, Two or more registration dictionaries are prepared for the registration dictionary data base 20, and the dictionary which registers fingerprint feature amounts may be chosen based on the characteristic quantity for main classes, or it may be made to choose the registration dictionary referred to at the time of fingerprint authentication processing.
[0085]Next, the registration processing 2 is explained with reference to the flow chart of drawing 17. Here, the case where the pressure of the finger 4 is used is explained as characteristic quantity for main classes.
[0086]In Step S51 and Step S52, the same processing as Step S1 of drawing 13 and Step S2 is performed.
[0087]In Step S53, the matching part 16 chooses from two or more registration dictionaries of the registration dictionary data base 20 the registration dictionary for registering the fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 based on the extraction result of the characteristic quantity for main classes inputted from the comparing element 13.
[0088]As shown in drawing 18, they are formed in the registration dictionary data base 20 by three registration dictionaries of the registration dictionary 71-1 thru/or 71-3, and in the registration dictionary 71-1. They are registered by the fingerprint feature amounts judged that a pressure is size with ID uniquely assigned to the fingerprint feature amounts registered into the same dictionary, and in the registration dictionary 71-2. They are registered by the fingerprint feature amounts judged that a pressure is inside with ID uniquely assigned to the fingerprint feature amounts registered into the same dictionary, and in the registration dictionary 71-3. The

fingerprint feature amounts judged that a pressure is smallness are registered with ID uniquely assigned to the fingerprint feature amounts registered into the same dictionary. That is, the matching part 16 chooses whether based on the extraction result of the characteristic quantity for main classes inputted from the comparing element 13, the fingerprint feature amounts inputted into which registration dictionary from Image Processing Division and the feature extraction part 19 the registration dictionary 71-1 thru/or among 71-3 are registered.

[0089]In Step S54, the matching part 16 registers into the registration dictionary selected in Step S53 the fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19, and processing is ended.

[0090]Although the case where the pressure of the finger 4 was detected was explained as characteristic quantity for main classes here, Also in the case where the temperature of the finger 4, humidity, thickness, the concentration of a color, area, an angle, or acutance of image is used as characteristic quantity for main classes, for example, The suitable registration dictionary is chosen from two or more registration dictionaries by the registration processing 2 explained using drawing 17, and the same processing, and a user's fingerprint feature amounts are registered by them.

[0091]Next, with reference to the flow chart of drawing 19, the fingerprint authentication processing 3 of a fingerprint collation device in which it has the registration dictionary data base 20 registered by the registration processing 2 explained using drawing 17 is explained.

[0092]In Step S61 and Step S62, the same processing as Step S1 of drawing 13 and Step S2 is performed.

[0093]In Step S63, the matching part 16 chooses a registration dictionary based on the extraction result of the characteristic quantity for main classes inputted from the comparing element 13. That is, the matching part 16 chooses the registration dictionary corresponding to the extraction result of the characteristic quantity for main classes inputted from the comparing element 13 the registration dictionary 71-1 explained using drawing 18 thru/or among 71-3.

[0094]In Step S64, the matching part 16 performs fingerprint authentication processing based on the data registered into the registration dictionary selected in Step S63.

[0095]In Step S65 thru/or Step S67, the same processing as Step S15 of drawing 15 thru/or Step S17 is performed, and processing is ended.

[0096]By performing such processing, it becomes unnecessary for the matching part 16 to compare the fingerprint feature amounts inputted as all the fingerprint-feature-amounts data registered into the registration dictionary data base 20, and it can accelerate collation processing.

[0097]However, in the fingerprint authentication processing 3 explained using drawing 19, Depending on the element chosen as characteristic quantity for main classes, and the reference value registered into the reference value memory 14. There is a possibility (that is, the fingerprint feature amounts corresponding to a different registration dictionary are registered) that the fingerprint feature amounts corresponding to the registration dictionary chosen in Step S63 are not registered, slightly.

[0098]Then, based on the characteristic quantity extraction result for main classes, the priority of reference of a registration dictionary is determined and it may be made to perform fingerprint authentication processing. The fingerprint authentication processing 4 is explained with reference to the flow chart of drawing 20.

[0099]In Step S81 and Step S82, the same processing as Step S1 of drawing 13 and Step S2 is performed.

[0100]In Step S83, the matching part 16 determines the reference ranking of the registration dictionary of the registration dictionary data base 20 based on the extraction result of the characteristic quantity for main classes inputted from the comparing element 13. For example, when the characteristic quantity for main classes extracted in Step S82 is a pressure "size", The registration dictionary which serves as the 1st place of reference ranking the registration dictionary 71-1 explained using drawing 18 thru/or among 71-3, The registration dictionary which turns into the registration dictionary 71-1 in which the fingerprint feature amounts registered as a pressure "size" are registered, and serves as the 2nd place of reference ranking, The

registration dictionary which turns into the registration dictionary 71-2 in which the fingerprint feature amounts registered as a pressure "inside" are registered, and serves as the 3rd place of reference ranking turns into the registration dictionary 71-3 in which the fingerprint feature amounts registered as a pressure "smallness" are registered.
[0101]In Step S84, the matching part 16 chooses the registration dictionary (here registration dictionary 71-1) of the 1st place of reference ranking, and performs fingerprint authentication processing in the selected registration dictionary in Step S85.
[0102]In Step S86, the matching part 16 judges whether there is any fingerprint-feature-amounts data which agrees with the fingerprint feature amounts inputted into the selected registration dictionary from Image Processing Division and the feature extraction part 19.
[0103]When it is judged that there is fingerprint-feature-amounts data which agrees with the fingerprint feature amounts inputted into the selected registration dictionary in Step S86, in Step S87, the signal which shows that the matching part 16 was compared correctly is outputted, and processing is ended.
[0104]In Step S86, when it is judged that there is no fingerprint-feature-amounts data which agrees with the fingerprint feature amounts inputted into the selected registration dictionary, in Step S88, the matching part 16 judges whether there is any registration dictionary which has not been referred to yet.
[0105]In Step S88, when it is judged that there is a registration dictionary which has not been referred to yet, in Step S89, the matching part 16 chooses the registration dictionary of the following reference ranking, processing returns to Step S85 and processing after it is repeated.
[0106]In Step S88, when it is judged that there is no registration dictionary which has not been referred to yet, in Step S90, the signal which shows that the matching part 16 was not compared correctly is outputted, and processing is ended.
[0107]By processing explained using drawing 20, when the reference ranking of a registration dictionary is determined and extraction of the characteristic quantity for main classes is successful with the characteristic quantity for main classes, Since fingerprint authentication processing is performed promptly and compared fingerprint feature amounts from all the registration data still more nearly eventually, when extraction of the characteristic quantity for main classes goes wrong, a right collated result can be obtained.
[0108]Although the case where one kind of characteristic quantity for main classes was detected above was explained, it may be made to use for registration of fingerprint feature amounts, and fingerprint authentication processing among the characteristic quantity for main classes mentioned above like a pressure, an angle and temperature, and acutance of image for example, combining arbitrary things two or more.
[0109]Drawing 21 is a block diagram showing the internal configuration of the fingerprint collation device currently made as [be / extraction of two kinds of characteristic quantity for main classes / possible].
[0110]The fingerprint collation device of drawing 21 replaces the pressure sensor 6 of the fingerprint collation device explained using drawing 2, The humidity sensor 81 (humidity sensor 81 formed instead of the pressure sensor 6 of a fingerprint reading part explained using drawing 1) is formed, and the density calculation section 31 explained using drawing 5 and drawing 6 is formed further.
[0111]Namely, the humidity of a user's finger 4 detected by the humidity sensor 81, The image data corresponding to a user's fingerprint which was inputted into the comparing element 13 and detected by CCD5 via the amplifier 11 and the A/D conversion part 12, While being inputted into Image Processing Division and the feature extraction part 19, extracting fingerprint feature amounts via the amplifier 17 and the A/D conversion part 18 and being outputted to the matching part 16, it is outputted to the density calculation section 31, and the concentration of the color a user's finger 4 is computed and it is outputted to the comparing element 13. The reference value about the reference value about humidity and concentration is recorded on the reference value memory 14, respectively, and the comparing element 13 classifies two kinds of characteristic quantity for main classes inputted based on the reference value currently recorded on the reference value memory 14, respectively, and outputs a classification result to

the matching part 16.
[0112]The matching part 16 registers into the registration dictionary data base 20 a user's fingerprint feature amounts inputted from Image Processing Division and the feature extraction part 19 in the registration processing of fingerprint data based on two kinds of characteristic quantity for main classes into which it was inputted from the comparing element 13. The fingerprint feature amounts of the user by whom the matching part 16 was inputted from Image Processing Division and the feature extraction part 19 in fingerprint authentication processing, Based on two kinds of characteristic quantity for main classes inputted from the comparing element 13, it searches from the registration dictionary data base 20, and it judges whether it is in agreement with the fingerprint with which the user's inputted fingerprint is registered, and the result is outputted.
[0113]Next, with reference to the flow chart of drawing 22, the registration processing 3 of the fingerprint feature amounts using the fingerprint collation device explained using drawing 21 is explained.
[0114]In Step S101, the same processing as Step S1 of drawing 13 is performed.
[0115]In Step S102, by processing explained using drawing 6, the density calculation section 31 detects the concentration of the color a user's finger 4, and outputs it to the comparing element 13. the concentration of the color a user's [/ based on the reference value about the concentration by which the comparing element 13 is recorded on the reference value memory 14] finger 4 -- "-- dark" and "inside" -- "-- it judges any of light" they are, and outputs to the matching part 16 as the characteristic quantity 1 for main classes.
[0116]In Step S103, the matching part 16 chooses the registration dictionary which registers the fingerprint feature amounts extracted in Step S101 among two or more registration dictionaries currently prepared for the registration dictionary data base 20 based on the extraction result of the characteristic quantity 1 for main classes in Step S102.
[0117]Namely, as shown in drawing 23, to the registration dictionary data base 20. It is formed by the registration dictionary 91-1 thru/or the registration dictionary 91-3, and in the registration dictionary 91-1. concentration -- "-- the fingerprint feature amounts judged to be dark" are registered, and the fingerprint feature amounts judged that concentration is "inside" are registered into the registration dictionary 91-2 -- the registration dictionary 91-3 -- concentration -- "-- the fingerprint feature amounts judged to be light" are registered.
[0118]In Step S104, by comparing the signal inputted from the humidity sensor 81 with the reference value about humidity currently recorded on the reference value memory 14 via the amplifier 11 and the A/D conversion part 12, the comparing element 13 extracts the characteristic quantity 2 for main classes, and outputs it to the matching part 16.
[0119]In Step S105, the matching part 16 registers fingerprint feature amounts into the registration dictionary selected based on the extraction result of the characteristic quantity 1 for main classes in Step S103 with the extraction result of the characteristic quantity 2 for main classes, and processing is ended.
[0120]Fingerprint feature amounts are recorded with the classification (in drawing 23, they are three quantity, inside, and low classifications) of ID uniquely assigned to the selected registration dictionary 91-1 thru/or either of 91-3 to the fingerprint feature amounts registered into the same dictionary, and humidity, as shown in drawing 23.
[0121]Next, with reference to the flow chart of drawing 24, the fingerprint authentication processing 5 of a fingerprint collation device in which registration processing was performed by the processing explained using drawing 22 is explained.
[0122]In Step S111 thru/or Step S114, the same processing as Step S101 of drawing 22 thru/or Step S104 is performed.
[0123]In Step S115, the matching part 16 chooses and extracts only the fingerprint-feature-amounts data corresponding to the extraction result of the characteristic quantity 2 for main classes in Step S114 from the registration dictionary selected in Step S113. namely, the extraction result of the characteristic quantity 1 for main classes -- concentration -- "-- when it is dark" and the extraction result of the characteristic quantity 2 for main classes is humidity "inside", only the fingerprint-feature-amounts data which is humidity "inside" is extracted from

the registration dictionary 91-1 explained using drawing 23.
[0124]In Step S116, the matching part 16 performs fingerprint authentication processing to the image data corresponding to a user's fingerprint inputted from Image Processing Division and the feature extraction part 19 using the fingerprint-feature-amounts data extracted in Step S115.
[0125]In Step S117 thru/or Step S119, the same processing as Step S15 of drawing 15 thru/or Step S17 is performed, and processing is ended.
[0126]Since it compares with the inputted fingerprint feature amounts after the matching part 16 narrows down all the fingerprint-feature-amounts data registered into the registration dictionary data base 20 with two characteristic quantity for main classes by performing such processing, collation processing is accelerable.
[0127]However, in the fingerprint authentication processing 5 explained using drawing 24, Depending on the element chosen as the characteristic quantity 1 and 2 for main classes, and the reference value registered into the reference value memory 14. The fingerprint feature amounts corresponding to the registration dictionary chosen in Step S113 are not registered (.). Namely, a possibility that the fingerprint feature amounts corresponding to a different registration dictionary are registered, There is a possibility (that is, it is related with the different characteristic quantity 2 for main classes, and corresponding fingerprint feature amounts are registered) that fingerprint feature amounts [be / it / under / of the fingerprint-feature-amounts data extracted in Step S115 / correspondence] are not registered, slightly.
[0128]Then, based on the extraction result of the characteristic quantity extraction 1 and 2 for main classes, the priority of the characteristic quantity 2 for main classes used for extraction of the priority of reference of a registration dictionary and fingerprint-feature-amounts data is determined, and it may be made to perform fingerprint authentication processing. The fingerprint authentication processing 6 is explained with reference to the flow chart of drawing 25 and drawing 26.
[0129]In Step S131 and Step S132, the same processing as Step S101 of drawing 22 and Step S102 is performed.
[0130]In [the matching part 16 determines the reference ranking of a registration dictionary in Step S133 based on the extraction result of the characteristic quantity 1 for main classes inputted from the comparing element 13, and] Step S134, The registration dictionary of the 1st place of reference ranking is chosen based on the reference ranking of the registration dictionary determined by processing of Step S133.
[0131]In Step S135, the same processing as Step S104 of drawing 22 is performed.
[0132]In [the matching part 16 determines the priority of the characteristic quantity 2 for main classes in Step S136 based on the extraction result of the characteristic quantity 2 for main classes inputted from the comparing element 13, and] Step S137, Only the fingerprint-feature-amounts data corresponding to the extraction result of the characteristic quantity 2 for main classes is chosen and extracted from the registration dictionary selected at Step S134. namely, the extraction result of the characteristic quantity 1 for main classes -- concentration -- "-- when it is dark" and the extraction result of the characteristic quantity 2 for main classes is humidity "inside", only the fingerprint-feature-amounts data which is humidity "inside" is extracted from the registration dictionary 91-1 explained using drawing 23.
[0133]In Step S138 and Step S139, the same processing as Step S116 of drawing 24 and Step S117 is performed.
[0134]In Step S139, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, processing progresses to Step S146.
[0135]When it is judged that there is no fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts in Step S139, in Step S140 the matching part 16, The fingerprint-feature-amounts data which was determined in Step S136 among the fingerprint-feature-amounts data registered into the registration dictionary chosen and which has the main class characteristic quantity 2 of the following priority according to the priority of the characteristic quantity 2 for main classes is extracted, and fingerprint authentication processing is performed using it.
[0136]In Step S141, the same processing as Step S139 is performed, and in Step S141, when it

is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, processing progresses to Step S146.
[0137]In Step S141, when it is judged that there is no fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, in Step S142, the matching part 16 judges whether the selected registration dictionary has fingerprint-feature-amounts data which has not been used for collation processing yet. In Step S142, when it is judged that the selected registration dictionary has fingerprint-feature-amounts data which has not been used for collation processing yet, processing returns to Step S140 and processing after it is repeated.
[0138]In Step S142, when it is judged that there is no fingerprint-feature-amounts data which has not been used for collation processing yet in the selected registration dictionary, in Step S143, the matching part 16 judges whether the registration dictionary data base 20 has a registration dictionary which has not been referred to yet.
[0139]When it is judged that there is a registration dictionary which has not been referred to yet in Step S143, in Step S144 the matching part 16, Based on the reference ranking of the registration dictionary determined in Step S133, the registration dictionary of the following reference ranking is chosen, processing returns from the registration dictionary data base 20 to Step S137, and processing after it is repeated.
[0140]In Step S143, when it is judged that there is no registration dictionary which has not been referred to yet, in Step S145, the signal which shows that the matching part 16 was not compared correctly is outputted, and processing is ended.
[0141]in Step S139, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, In Step S141, when it is judged that there is fingerprint-feature-amounts data which agrees with the inputted fingerprint feature amounts, in Step S146, the signal which shows that the matching part 16 was compared correctly is outputted, and processing is ended.
[0142]Since the data referred to in the registration dictionary which the reference ranking of the registration dictionary was determined with the characteristic quantity 1 for main classes by the processing explained using drawing 25 and drawing 26, and was chosen by it by the characteristic quantity 2 for main classes was narrowed down further, Since fingerprint authentication processing is performed promptly and compared fingerprint feature amounts from all the registration data still more nearly eventually when extraction of the characteristic quantity for main classes was successful, when extraction of the characteristic quantity for main classes goes wrong, a right collated result can be obtained.
[0143]Although the case where used a user's fingerprint for an individual's specification and collation processing was performed above was explained, also when acquiring the image data of palm print and a user's face with a CCD camera etc. and performing collation processing for example, can be adapted of this invention.
[0144]
[Effect of the Invention]According to the personal identification device of this invention, the thing corresponding to the 2nd information that related the 1st acquired information with the classification result of the 2nd information, memorized and was newly acquired by the 2nd acquisition means among the 1st memorized information is chosen, Since collation processing is performed after a fingerprint, palm print, etc. which are used for collation processing are narrowed down based on information with comparatively little amount of information, including a pressure, temperature, or humidity, since it was made to compare with the 1st newly acquired information, It becomes possible to process promptly, without reducing authentication precision.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

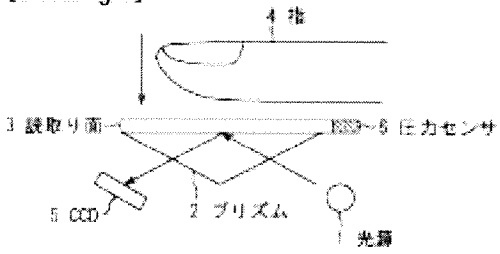
[Brief Description of the Drawings]
[Drawing 1]It is a side sectional view of the fingerprint reading part of the fingerprint collation device which was adapted in this invention.
[Drawing 2]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 3]It is a sectional view of the fingerprint reading part of the fingerprint collation device which was adapted in this invention.
[Drawing 4]It is a side sectional view of the fingerprint reading part of the fingerprint collation device which was adapted in this invention.
[Drawing 5]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 6]It is a figure for explaining a density calculation method.
[Drawing 7]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 8]It is a figure for explaining an area calculating method.
[Drawing 9]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 10]It is a figure for explaining an angle calculating method.
[Drawing 11]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 12]It is a figure for explaining the calculating method of the acutance of image of a finger.
[Drawing 13]It is a flow chart for explaining the registration processing 1.
[Drawing 14]It is a figure for explaining the data registered into the registration dictionary data base 20.
[Drawing 15]It is a flow chart for explaining the fingerprint authentication processing 1.
[Drawing 16]It is a flow chart for explaining the fingerprint authentication processing 2.
[Drawing 17]It is a flow chart for explaining the registration processing 2.
[Drawing 18]It is a figure for explaining the data registered into the registration dictionary data base 20.
[Drawing 19]It is a flow chart for explaining the fingerprint authentication processing 3.
[Drawing 20]It is a flow chart for explaining the fingerprint authentication processing 4.
[Drawing 21]It is a block diagram showing the internal configuration of the fingerprint collation device which was adapted in this invention.
[Drawing 22]It is a flow chart for explaining the registration processing 3.
[Drawing 23]It is a figure for explaining the data registered into the registration dictionary data base 20.
[Drawing 24]It is a flow chart for explaining the fingerprint authentication processing 5.
[Drawing 25]It is a flow chart for explaining the fingerprint authentication processing 6.
[Drawing 26]It is a flow chart for explaining the fingerprint authentication processing 6.
[Description of Notations]

5 CCD
6 Pressure sensor
13 Comparing element 13
14 Reference value memory 14
15 Interface 15
16 Matching part 16
19 Image Processing Division and the feature extraction part 19
20 Registration dictionary data base 20
21 Photosensor
31 Density calculation section 31
41 Area calculation part 41
51 Angle calculation part 51
61 Sequence-of-numbers calculation part
71-1 thru/or a 71-3 registration dictionary
81 Humidity sensor 81
91-1 thru/or a 91-3 registration dictionary

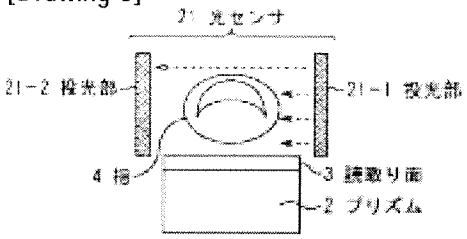
[Translation done.]

DRAWINGS

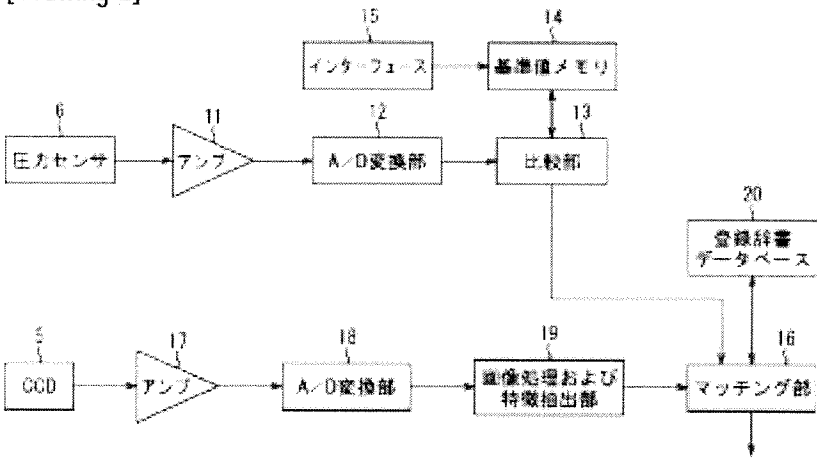
[Drawing 1]



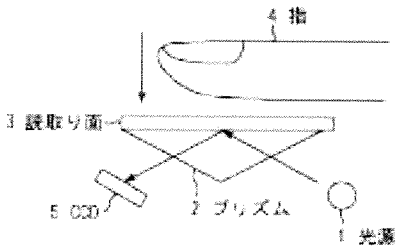
[Drawing 3]



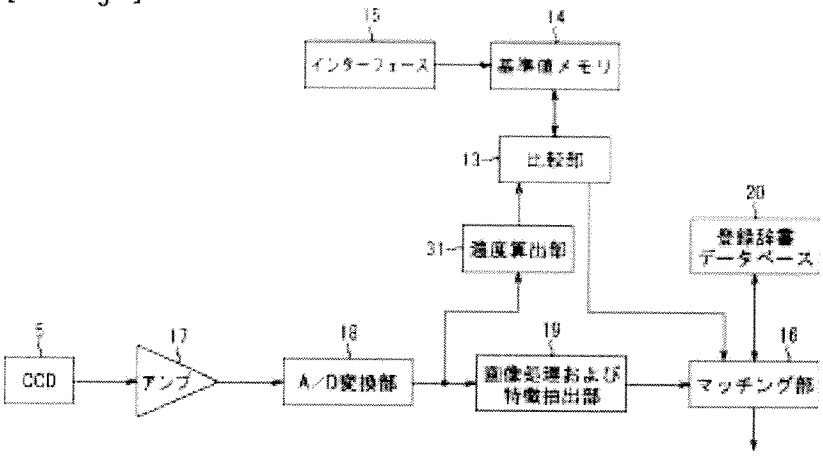
[Drawing 2]



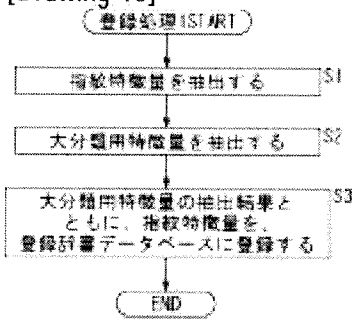
[Drawing 4]



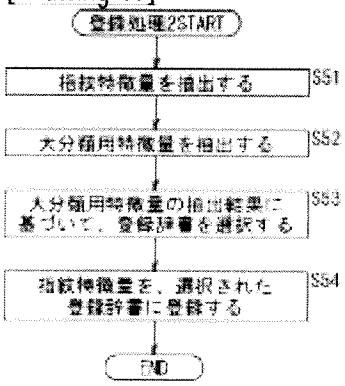
[Drawing 5]



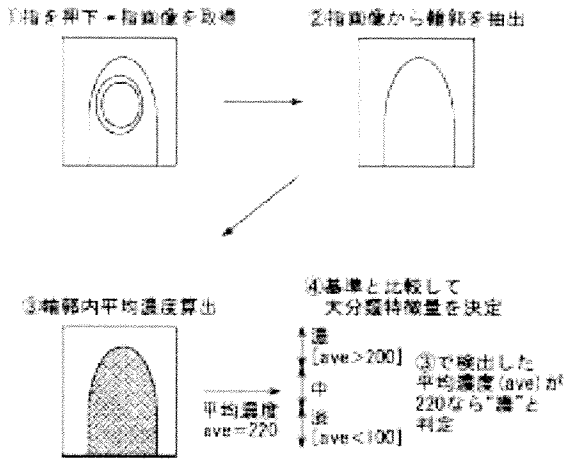
[Drawing 13]



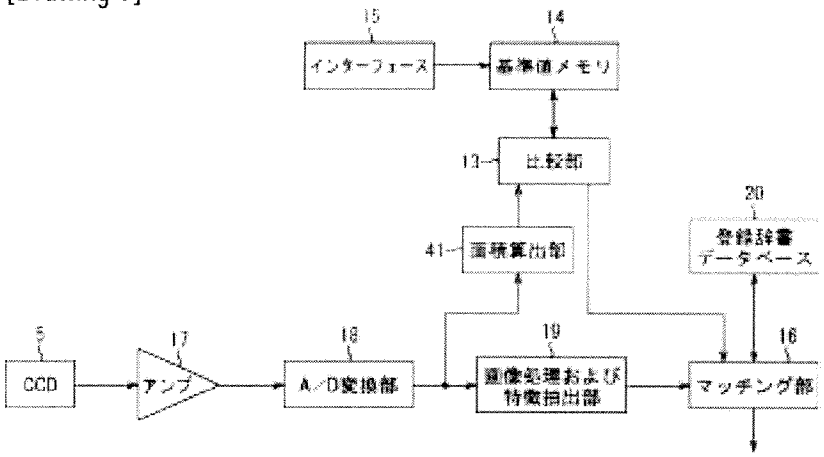
[Drawing 17]



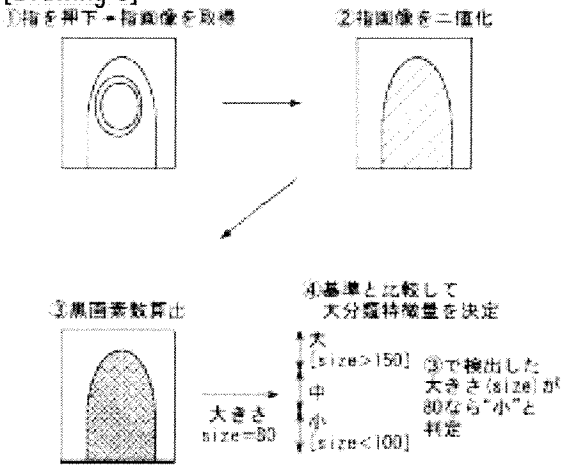
[Drawing 6]



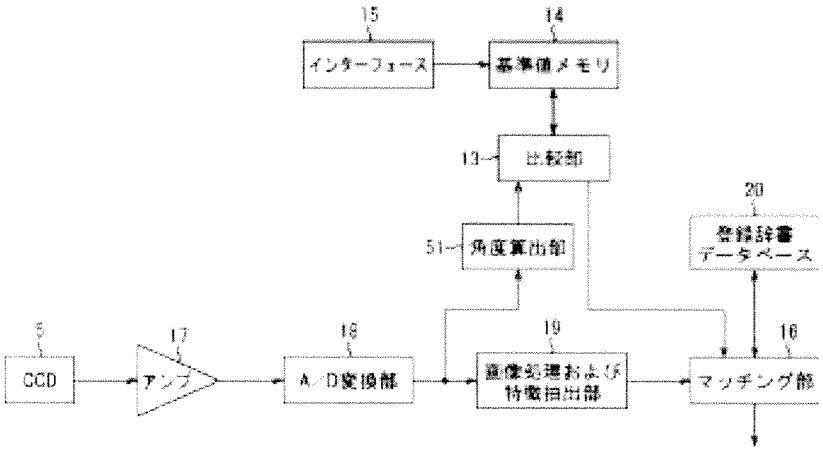
[Drawing 7]



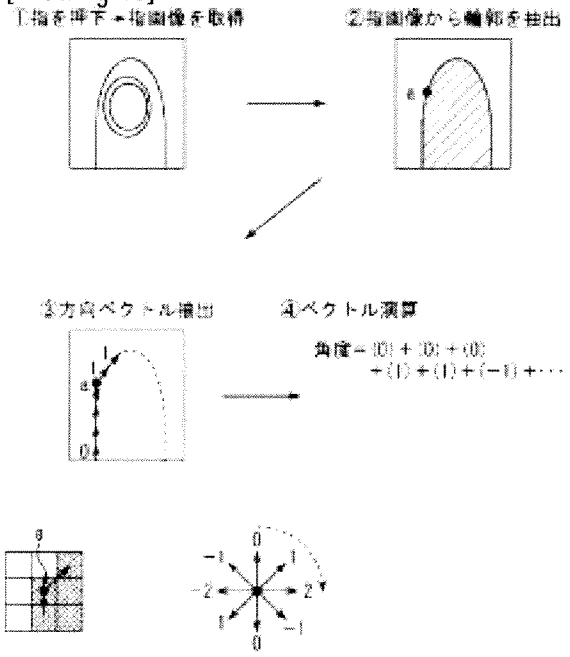
[Drawing 8]



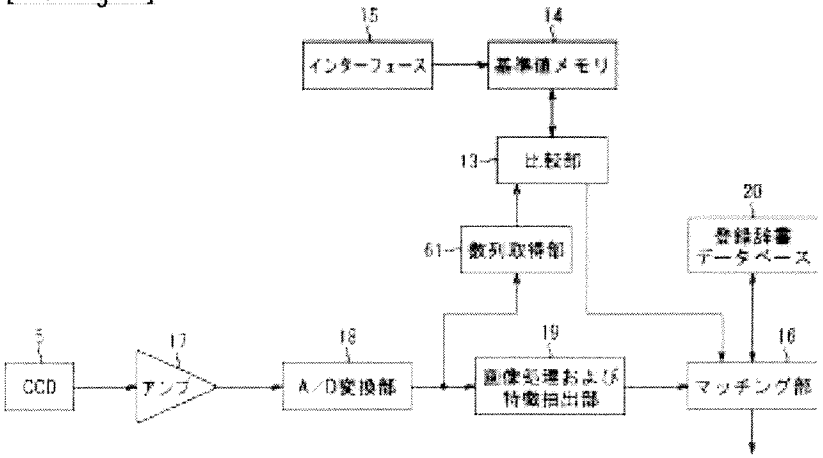
[Drawing 9]



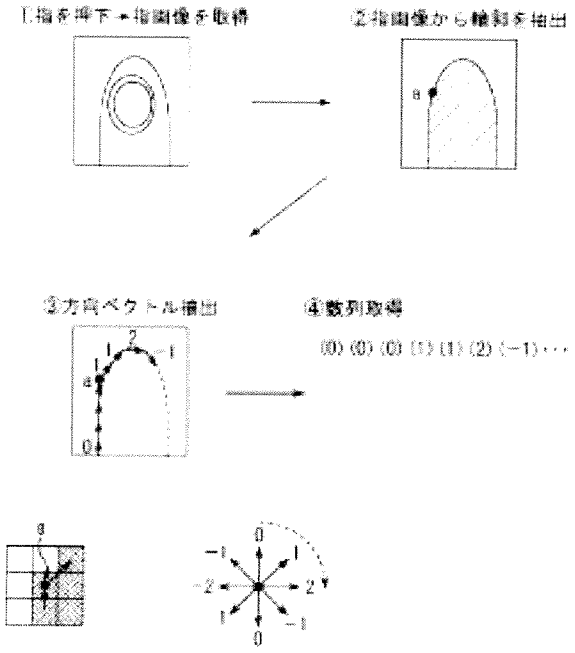
[Drawing 10]



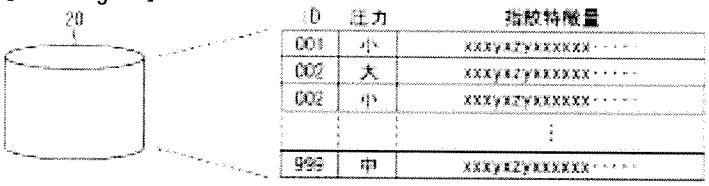
[Drawing 11]



[Drawing 12]

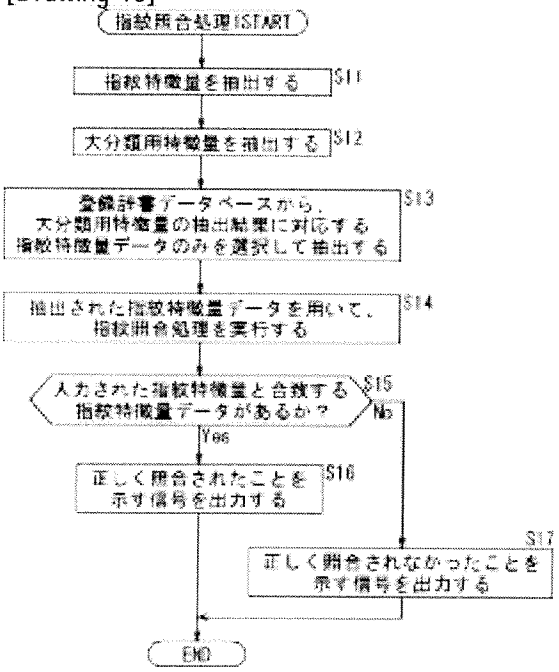


[Drawing 14]

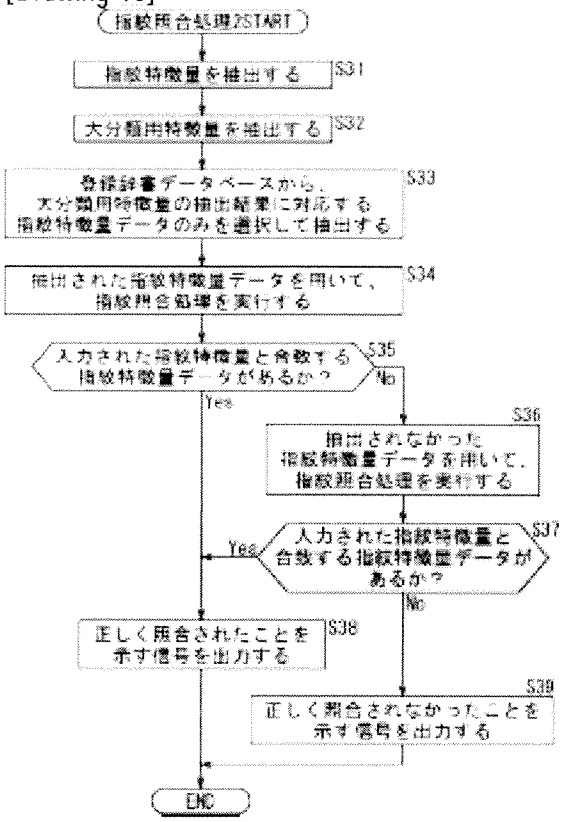


登録許害データベース20に登録されるデータ

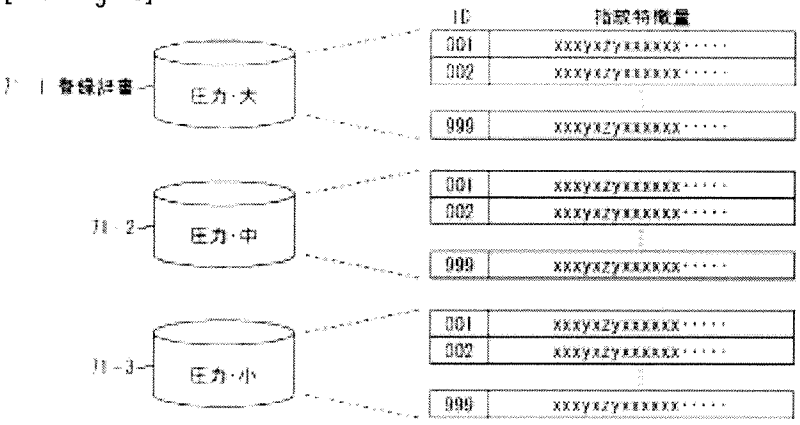
[Drawing 15]



[Drawing 16]

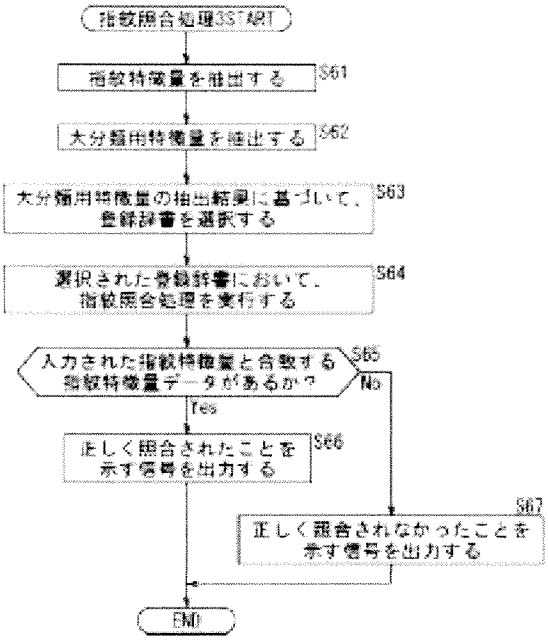


[Drawing 18]

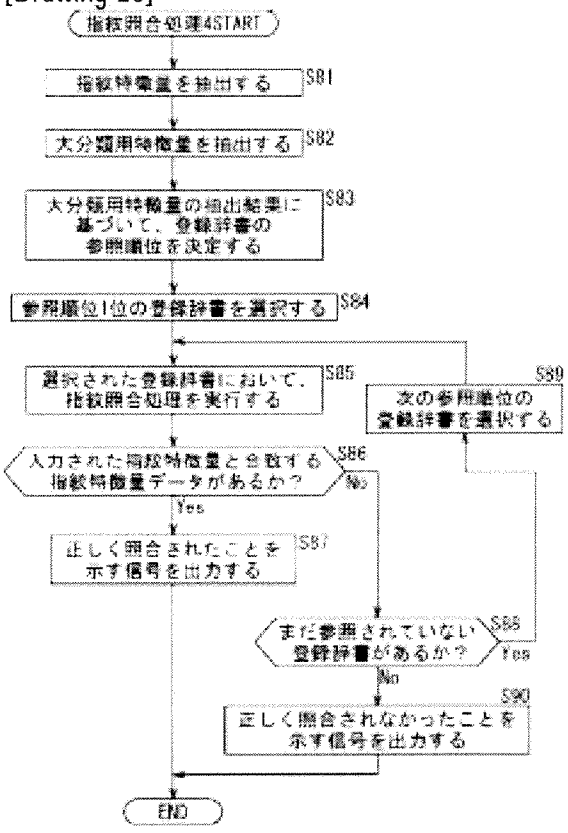


登録辞書データベース20の登録辞書

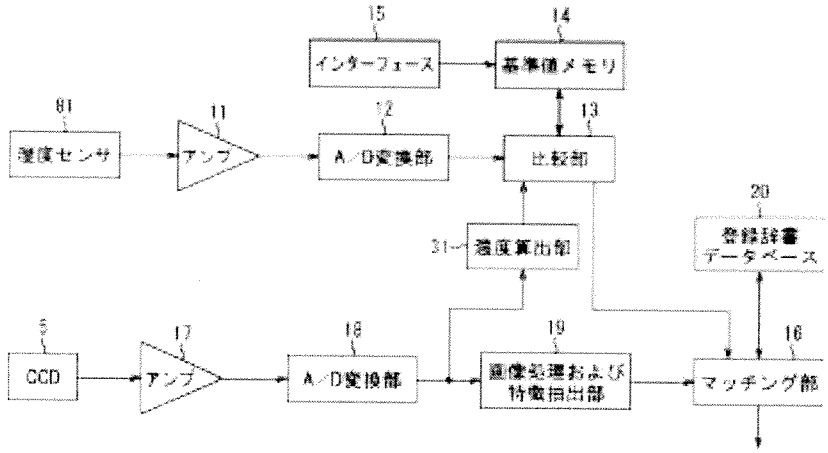
[Drawing 19]



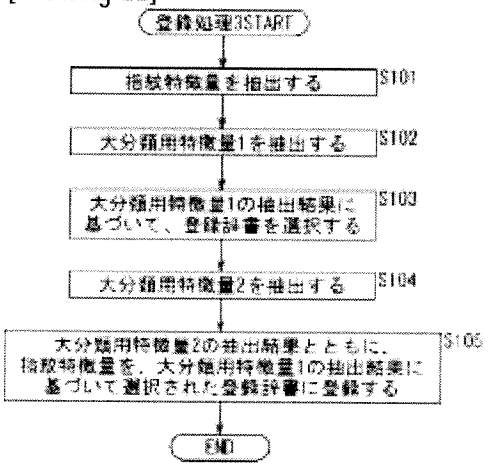
[Drawing 20]



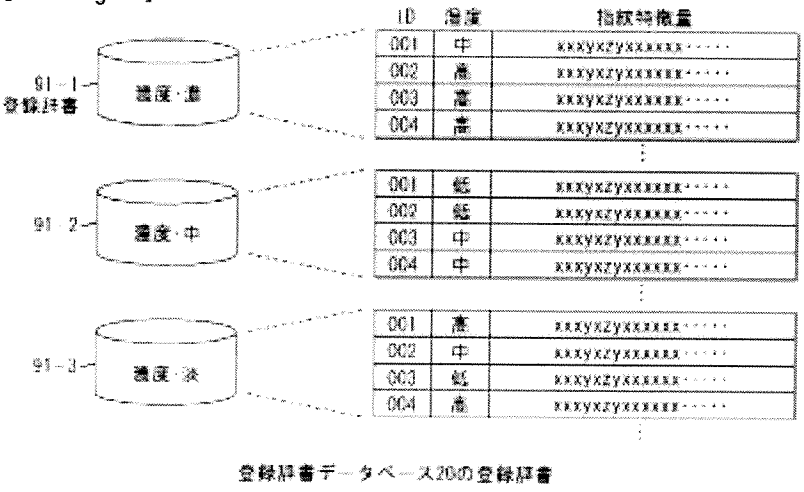
[Drawing 21]



[Drawing 22]

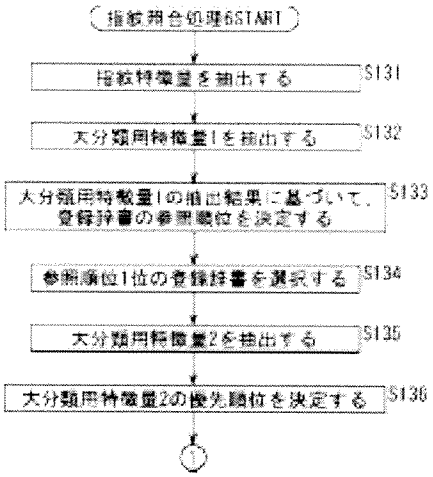


[Drawing 23]

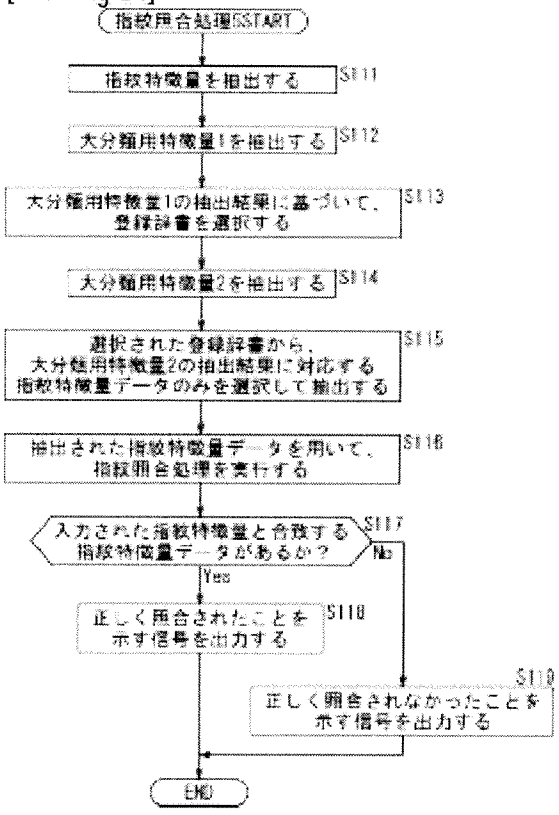


登録辞書データベース20の登録辞書

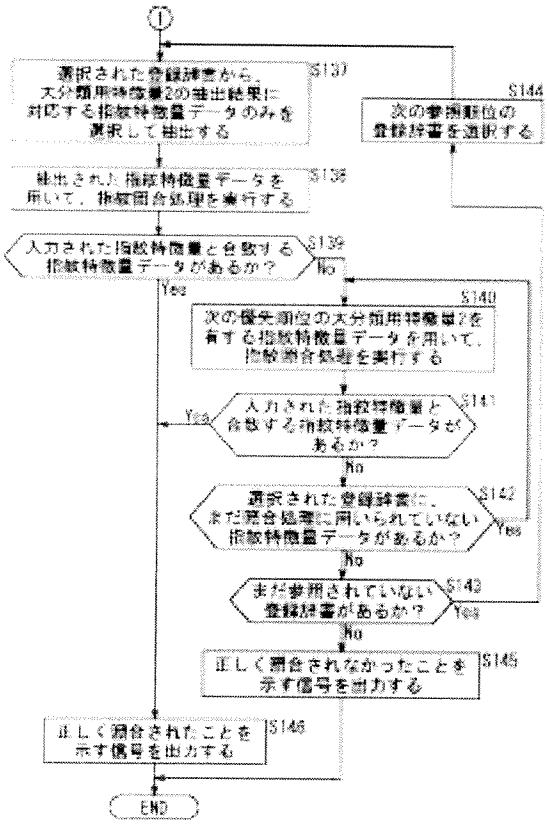
[Drawing 25]



[Drawing 24]



[Drawing 26]



[Translation done.]